

What is claimed is:

1. A method of manufacturing a printed circuit board with embedded capacitors, comprising the following steps of:

5 (i) forming a ground layer copper foil on an inner layer of a printed circuit board, followed by roughening a surface of the ground layer copper foil;

(ii) coating a polymer capacitor paste having high-dielectric constant at a predetermined thickness on
10 the ground layer copper foil, and curing the coated polymer capacitor paste;

(iii) layering a power layer copper foil onto the cured capacitor;

(iv) forming a dry film pattern on the power layer
15 copper foil, and etching the dry film pattern by use of an etching mask so that the power layer copper foil is partitioned;

(v) layering an insulation layer-attached copper film onto the power layer copper foil;

20 (vi) forming a blind via-hole and a through-hole at predetermined portions of the insulation layer-attached copper film; and

(vii) plating the blind via-hole and the through-hole for layer connection.

2. The method as defined in claim 1, wherein the insulation layer-attached copper film is a resin-coated copper foil.

5 3. The method as defined in claim 2, wherein the resin-coated copper foil is layered by a built-up process.

4. The method as defined in claim 1, wherein the surface of the ground layer copper foil is roughened at a
10 thickness of 1-2 μm to increase a bonding force between the ground layer copper foil and the capacitor paste.

5. The method as defined in claim 1, wherein the surface of the ground layer copper foil is roughened by any
15 method selected from the group consisting of soft etching, black oxide, brown oxide, MEC (Acid Base Chemical), ceramic buff, and Z-scrubbing.

6. The method as defined in claim 1, wherein the
20 capacitor paste is in a mixed composite form of BaTiO_3 ceramic powders having high-dielectric constant of 1,000-10,000 with a thermosetting epoxy resin or polyimide.

7. The method as defined in claim 1, wherein the
25 capacitor paste is a polymer ceramic composite having a

dielectric constant of 80-90 by uniformly dispersing BaTiO₃ powders comprising bimodal micropowders of 0.9 μm in diameter and 60 nm in diameter mixed at a volume ratio of 3:1-5:1 into an epoxy resin.

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8. The method as defined in claim 1, wherein the above coating step (ii) is performed by a screen printing process or a roll coating process.

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9. The method as defined in claim 1, wherein the capacitor paste is coated at a thickness of 8-25 μm.

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10. The method as defined in claim 1, wherein a liquid phase of the capacitor paste is semi-dried to a solid phase of B-stage at 90-110°C for 10 min in an oven.

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11. The method as defined in claim 10, wherein the capacitor paste semi-dried to the B-stage is completely dried at 150-180 °C for 30-60 min under 35 kg/cm².

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12. The method as defined in claim 1, wherein the power layer copper is partitioned so that when each constituent part to be mounted on the printed circuit board has different operation powers, the power layer copper foil is divided into cells corresponding to each operation power.

13. The method as defined in claim 1, wherein the blind via-hole is formed by use of a laser drill, and the through-hole is formed using a mechanical drill.

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14. The method as defined in claim 1, wherein the blind via-hole and the through-hole are connected to the power layer copper foil and the ground layer copper foil formed on the inner layer of the printed circuit board through electroless copper plating, respectively.

15. The method as defined in claim 1, further comprising the step of connecting the power layer copper foil and the ground layer copper foil to a power pad and a ground pad of an integrated circuit chip to be mounted on the printed circuit board, respectively.

16. The method as defined in claim 15, wherein a capacitor layer coated with the capacitor paste functions as a decoupling capacitor for the integrated circuit chip.

17. A printed circuit board with embedded capacitors, comprising:

(a) an inner layer of a multi-layered printed circuit board having a copper clad laminate adhered thereon

by means of an adhesive;

(b) a ground layer copper foil having a roughened surface, formed at a top and a bottom of the inner layer;

5 (c) a polymer capacitor paste having high-dielectric constant coated at a predetermined thickness and cured on the ground layer copper foil;

(d) a power layer copper foil formed on the cured capacitor, in which a dry film pattern is laminated
10 on the power layer copper foil and is etched by use of an etching mask to partition the power layer copper foil;

(e) an insulation layer-attached copper film formed on the power layer copper foil;

15 (f) a blind via-hole and a through-hole formed at predetermined portions of the insulation layer-attached copper film; and

(g) plated layers of the blind via-hole and the through-hole for layer connection of the printed
20 circuit board.

18. The printed circuit board as defined in claim 17, wherein the insulation layer-attached copper film is a resin-coated copper foil.

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19. The printed circuit board as defined in claim 17,
wherein the surface of the ground layer copper foil is
roughened at a thickness of 1-2 μm to increase a bonding
force between the ground layer copper foil and the capacitor
5 paste.

20. The printed circuit board as defined in claim 17,
wherein the capacitor paste is in a mixed composite form of
 BaTiO_3 ceramic powders having high-dielectric constant of
10 1,000-10,000 and a thermosetting epoxy resin or polyimide.

21. The printed circuit board as defined in claim 17,
wherein the capacitor paste is a polymer ceramic composite
having a dielectric constant of 80-90 by uniformly
15 dispersing BaTiO_3 powders comprising bimodal micropowders of
0.9 μm in diameter and 60 nm in diameter mixed at a volume
ratio of 3:1-5:1 into an epoxy resin.

22. The printed circuit board as defined in claim 17,
20 wherein the capacitor paste is coated at a thickness of 8-25
 μm .

23. The method as defined in claim 17, wherein a
liquid phase of the capacitor paste is semi-dried to a solid
25 phase of B-stage at 90-110°C for 10 min in an oven.

24. The method as defined in claim 23, wherein the capacitor paste semi-dried to the B-stage is completely dried at 150-180 °C for 30-60 min under 35 kg/cm².

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25. The method as defined in claim 17, wherein the power layer copper foil is partitioned so that when each constituent part to be mounted on the printed circuit board has different operation powers, the power layer copper foil
10 is divided to cells corresponding to each operation power.